



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/762,867	01/22/2004	Carl S. Kirkconnell	PD-03W067	5931
7590	11/01/2005			
John E. Gunther Raytheon Company P.O. Box 902 (E1/E150) El Segundo, CA 90245-0902			EXAMINER DOERRLER, WILLIAM CHARLES	
			ART UNIT 3744	PAPER NUMBER

DATE MAILED: 11/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/762,867	Applicant(s) KIRKCONNELL ET AL.	
	Examiner William C. Doerrler	Art Unit 3744	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16-19 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-12, 15 and 20 is/are rejected.
- 7) ☒ Claim(s) 3, 13 and 14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 January 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>1-22-2004</u> . | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

### *Drawings*

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the cantilevered thermal interface of claim 12 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. The cantilevering is seen by the examiner as obvious to an ordinary practitioner in the art. If applicant concurs that cantilevering of any part is well known, the feature need not be shown in the drawings, as one of ordinary skill in the art would recognize that cantilevered positioning of parts is well known and possible to add to device shown in the figures.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1,4-8,15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Price et al '707 in view of Gao or Wang.

Price et al '707 discloses applicants' basic inventive concept, a hybrid Stirling/ pulse tube cooling system with a surge volume in communication with the second stage expander (see lines 53-61 of column 2 which discusses how the surge volume 33 is coupled to heat exchanger 34 at first thermal interface 35), substantially as claimed with the exception of maintaining the surge volume at ambient temperature. Gao and Wang

each shows this feature to be old in the cryocooler art (see the top of column 2 of Gao or the housing 110 of Wang which keeps the buffer (surge volume) at room temperature). It would have been obvious to one of ordinary skill in the art at the time of applicants' invention from the teaching of either Gao or Wang to modify the hybrid cryocooler of Price et al by maintaining the surge volume at ambient temperature to make the device easy to operate (by not requiring cooling of the surge volume).

Claims 1,2,4-8,15 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Price et al '707 in view of Kirkconell et al.

Price et al '707 discloses applicants' basic inventive concept, a hybrid Stirling/ pulse tube cooling system with a surge volume in communication with the second stage expander (see lines 53-61 of column 2 which discusses how the surge volume 33 is coupled to heat exchanger 34 at first thermal interface 35), substantially as claimed with the exception of coupling the surge volume to the thermal interface. Kirkconnell et al shows this feature to be old in the cryocooler art . It would have been obvious to one of ordinary skill in the art at the time of applicants' invention from the teaching of either Gao or Wang to modify the hybrid cryocooler of Price et al by coupling the surge volume to the first stage interface to ensure thermal contact between the first stage and the inertance tube.

Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Price et al '707 in view of any one of Gao, Wang or Kirkconnell et al as applied to claims 1,2,4-8,15 and 20 above, and further in view of Swift.

Price et al '707, as modified, disclose applicants' basic inventive concept, a hybrid Stirling/pulsetube cooling system with a surge volume in having a thermal interface with the first stage, substantially as claimed with the exception of maintaining the thermal interface at a sub-ambient temperature. Swift shows maintaining inertance tubes which connect a pulse tube to a surge volume to be old in the pulse tube art. It would have been obvious to one of ordinary skill in the art at the time of applicants' invention from the teaching of Swift to modify the cryocooler of Price et al by maintaining the inertance tube below ambient to achieve a colder final temperature and to improve control over the system.

#### ***Allowable Subject Matter***

Claims 3, 13 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 16-19 are allowed.


#### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kunitani et al show a pulse tube cooler with a buffer. Daniels, Rattray et al, Acharya et al, and Bonaquist et al show cryocoolers with cooled buffers or buffer interfaces.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Doerrler whose telephone number is (571) 272-4807. The examiner can normally be reached on Monday-Friday 6:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on (571) 272-4834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
William C Doerrler  
Primary Examiner  
Art Unit 3744

WCD